Operating instructions

Explosion isolation flap valve
REDEX® Flap DN140-DN400

The original operating instructions were written in German

rico CERTIFIED SAFETY

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Read the instructions prior to performing any task!

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1 General information

1.1 Manufacturer

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1.2 Purpose of the operating instructions

The purpose of the operating instructions is to provide the personnel employed by the operator with the necessary knowledge to safely handle the product. Safe handling includes (in addition to operation) all the phases of the product's life cycle described in these operating instructions, such as commissioning, set-up, use, cleaning, maintenance, decommissioning, transport, disposal etc.

1.3 Target group

The target group for these operating instructions includes the operator and certified service personnel.

Assembly, operation, maintenance and repair of the product may only be carried out by certified, specialist personnel.

Specialist personnel can only be certified by RICO Sicherheitstechnik AG or service partners authorised by RICO Sicherheitstechnik AG and certification must be renewed every two years.

1.4 Scope of application and use of the operating instructions

These operating instructions form an integral part of the product. Knowledge of the information contained therein is indispensable for safe and problem-free handling. The manufacturer waives any liability for damage to materials or injury to persons resulting from a lack of knowledge of, or non-adherence to, the operating instructions.

The operator is responsible for ensuring that it and all persons authorised for the activity in question on the product have read and understood the operating instructions in their entirety before commissioning.

Any questions or unclear points should be raised with the manufacturer or your sales representative.

1.5 Warranty and guarantee conditions

The product is designed according to state-of-the-art knowledge, constructed from high-quality materials and carefully checked and tested in the manufacturer's plant before delivery. However, should you identify any faults or damage during commissioning, operation, cleaning, maintenance, decommissioning or storage, please inform the manufacturer of these in writing immediately. The manufacturer will provide a replacement for the faulty or defective parts in the delivered equipment as part of the General Terms and Conditions of Sale and Delivery.

No warranty applies to damage resulting from:

- A lack of knowledge of, or non-adherence to, the operating instructions
- Use contrary to the intended use
- Inadequate maintenance
- Use of unsuitable replacement parts (only original replacement parts may be used)
- Use of unsuitable accessories
- Work performed by uncertified personnel

For warranty claims to be accepted, the damaged parts must be returned to the manufacturer together with a description of the defect and the serial number.

Material covered by the warranty will be replaced as quickly as possible ex works.

1.6 Storage

The operator is always responsible for the storage location of the operating instructions. The operating instructions must be available at all times to all persons employed by the operator in case they are required.

The operating instructions must be stored carefully for the entire 10 years of the product's service life, and if required, updated with subsequent information from the manufacturer.

If the product is sold or decommissioned, the operating instructions must be handed over to the new operator or disposal company.

Lost operating instructions can be re-ordered from the manufacturer by stating the fabrication number.

1.7 Copyright notice

1.8 Typographical conventions

Bold mark-up

Important information is marked in **bold** in order to draw the target group's attention.

1.9 Definition of terms

The explosion protection components VENTEX® ESI, explosion protection slide valve RSV, REDEX® Slide or REDEX® Flap are referred to as "product," "valve", "slide valve" or "flap" in these operating instructions.

2 General safety information

Handling-related safety information *provides warnings of risks and risk points associated with handling and are visible immediately* ***before the step in question****.*

2.1 Manufacturer’s area of responsibility

The manufacturer is responsible for the flawless delivery of the product from a technical safety perspective, including the operating instructions.

2.2 Operator’s area of responsibility

Assembly, operation, maintenance and repair of the product may only be carried out by certified, specialist personnel.

The operator and the certified specialist personnel must have fully read and understood the operating instructions.

2.2.1 Training, expertise

The operator ensures that all activities carried out on the product are performed by certified specialist personnel only.

2.2.2 Protective equipment

The operator ensures the provision of personal protective equipment appropriate to the situation for its employees (e.g. gloves, respiratory protection, hearing protection etc.).

2.2.3 Duty of maintenance and due diligence

The operator ensures that the product is maintained and operated in a technically perfect condition. The operator shall carry out the stipulated checks and the required maintenance work and shall authorise/organise all service and repair work, which can only be carried out by a certified specialist.

2.3 Intended use

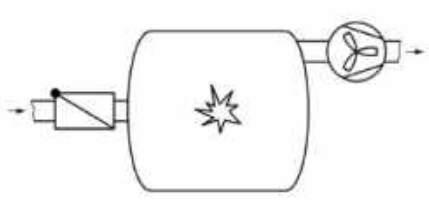

Fig. 1: Pull configuration, source EN 16447:2014 (3.4)

- The explosion isolation flap valve is built into pipes. It may only be used for the media, temperatures, pressures, installation position and internal pipe diameter specified in the order confirmation and the installation guideline. The RICO Sicherheitstechnik AG order confirmation is authoritative in the event of doubt.
- The valve is designed for lines through which **only dust** flows.
- The valve is certified for **pull configurations** as per EN 16447:2014.
- The valve is **single-acting** and works according to the recoil principle. The direction of flow and the direction of explosion are opposing.
- The valve may only be used in combination with pressure-relieved containers equipped with pressure-relief devices that cannot be reclosed.
- The valve may only be installed horizontally or in a horizontal pipeline.

Limit values

The limit values to be observed are stated in the installation guideline, which is available for planning purposes, and in the technical data sheet, which is included in the scope of delivery for the valve.

2.3.1 Process conditions

Intended use

It is imperative to ensure that the flap valve is used as intended at all times.

During loading with dust, it must always be ensured that the closing mechanism is never impaired during operation. For this reason, the following applies:

- The flow rate in the flap valve in processes with dust must be at least 12 m/s and must not exceed 35 m/s. It must be ensured that no dust deposits that could impair valve closure form.
- The air must be dry. No condensate is to form.
- In order to ensure that functional safety is not impaired, the maximum dust load of the medium that flows through must not exceed 100 g/m^3.
- Service must be carried out at short intervals (3 to 5 days) after commissioning. If the function is ensured, the time interval can be increased in accordance with the operating instructions.

- Suitable measures must be taken for dusts that may cause caking. The risk of caking is assessed by the customer and/or an expert.
- The dust must not cause any caking and/or clogging that could impair flap valve closure. It must be possible for the caking to be removed by the available flow rate once the caking reaches a certain size. If this is not the case, organisational and/or constructive measures are to be defined and taken.

  Potential measures:
  - Reducing the dust load: Lower dust loads reduce the risk of impermissible caking and/or blockages.
  - Adjustment of the flow rate: Depending on the medium flowing through, higher or lower flow rates can reduce the risk of impermissible caking.
  - Elimination of solids or large dust particles.
  - Shortening the maintenance interval: Manual removal of caking and deposits before they affect the closing mechanism.
  - Design engineering: Regularly shake off or blow off the dust deposits using a suitable device.
- If no measures can be taken to ensure the intended use, please switch to another RICO product (e.g. REDEX® Slide or explosion protection slide valve RSV). Please note that these are active systems (slide valve, control and detection). There is a fee for replacing the flap valve.

2.4 Types of safety information

DANGER!
Designates an **imminent danger**. If this danger is not avoided, **it will result in death or serious, irreversible injury**.

WARNING!
Designates a **potentially dangerous situation**. If this dangerous situation is not avoided, **it may result in death or serious, irreversible injury**.

CAUTION!
Designates a **potentially dangerous situation**. If this dangerous situation is not avoided, **it may result in minor or minimal, irreversible injury**.

NOTICE!
Designates a **potentially harmful situation**. If this potentially harmful situation is not avoided, **the product or something in its vicinity may be damaged**.

2.4.1 Symbols used

Warning symbol, suspended load

Fig. 2: Warning symbol, suspended load

Warning symbol, explosive atmosphere

Fig. 3: Warning symbol, explosive atmosphere

Warning symbol, hazardous substances

Fig. 4: Warning symbol, hazardous substances

Warning symbol, hot surface

Fig. 5: Warning symbol, hot surface

Warning symbol, hand injuries

Fig. 6: Warning symbol, hand injuries

Mandatory symbol, wear foot protection

Fig. 7: Mandatory symbol, wear foot protection

Mandatory symbol, wear ear protection

Fig. 8: Mandatory symbol, wear ear protection

2.4.2 User information

Information that refers to technical and commercial requirements. Non-adherence can lead to faults and production down-time.

2.5 Special dangers

Fig. 9: Warning symbol, explosive atmosphere

DANGER!

Insufficient functioning of the product due to improper assembly, maintenance or inspection. Danger to life due to spreading substances that are explosive and/or harmful to health!

Fig. 10: Warning symbol, hazardous substances

CAUTION!

Preparation for assembly, functionality test, revision and/or maintenance

- A **decontamination declaration** must be completed prior to inspection and/or maintenance work and must confirm that the product has been cleaned and no longer contains any residual substances that are harmful to health.
- If the product comes into contact with substances that are harmful to health, these substance must be entered in the decontamination declaration.
- The decontamination declaration may only be filled out and signed by the operator's authorised specialists.
- The decontamination declaration must be sent to RICO before the start of maintenance and/or inspection work (if activities are performed by RICO).
- Before carrying out any work on the product, it must be ensured that the product has cooled down.

Fig. 11: Warning symbol, hand injuries

Fig. 12: Warning symbol, hot surface

3 Product description

3.1 Functional principle

Fig. 13: REDEX® Flap rest position

The valve is in the rest position (no flow present) in a stationary position, but it is not locked.

Fig. 14: REDEX® Flap normal operation

The butterfly is moved to the open position by the flow, i.e. in normal operation. This allows the medium to flow through the valve.

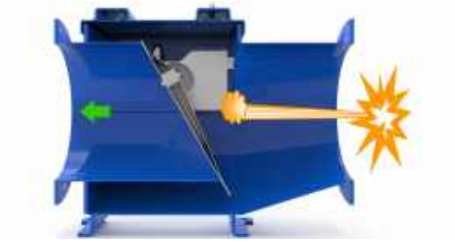

Fig. 15: REDEX® Flap explosive event

In the event of an explosion, the pressure wave moves the butterfly to the closed and locked position. This successfully decouples the explosion. The locking mechanism ensures that the butterfly remains closed even in the event of negative pressure.

3.2 Standard

*The explosion isolation flap valve is compliant with standard **EN 16447:2014**.*

3.3 ATEX approval

Fig. 16: Ex mark

- Test number: **FSA 14 ATEX 1653 X**
- Equipment group: II
- Equipment category: 1D/2D
- Protection system: D
- Corresponds to zone inside: 20, 21, 22
- Corresponds to zone outside: 21, 22 (as per name plate and switch data sheet)

3.4 Explosion pressure and process temperature

- Maximum permissible reduced explosion pressure: $P_{red\ max}$ as per installation guideline FT0008DE/GB or as per the name plate.
- Minimum explosion pressure (closing pressure): 0.05 bar
- Maximum process temperature: +80 °C or as per the specification on the technical data sheet or name plate.
- Minimum process temperature: +1 °C, note ↳ *Chapter 4.7 „Temperatures < +1 °C“ on page 18* in this regard.
- Maximum ambient temperature: +80 °C or as per the specification on the technical data sheet, the name plate or the approval for the switches.
- Minimum ambient temperature: -20 °C

3.5 Media

NOTICE!

The valve is designed and intended for use with organic dusts. Consequently, the valve must **not be operated with fluids, gases, hybrid mixtures or metallic dusts**.

3.6 Technical data

3.6.1 Technical data sheet & installation guideline

The scope of delivery for each valve includes a corresponding **technical data sheet**, which contains supplementary technical data.

See **installation guideline FT0008DE** for German, or **FT0008GB** for English. If these are not available, please contact us at *info@rico.ch*.

3.6.2 Name plate

A name plate is attached to every valve. It contains the following data:

- Manufacturer
- Classification
- Serial number
- Year of manufacture
- Part number
- Permissible application temperature range
- Permissible ambient temperatures
- ATEX zone inside/ATEX zone outside
- Direction of explosion
- Standard marking

3.6.3 Switches

The valve has two switches which detect the rest position (1) and the locked position (2). Additional information can be found in the manufacturer's description of the switches.

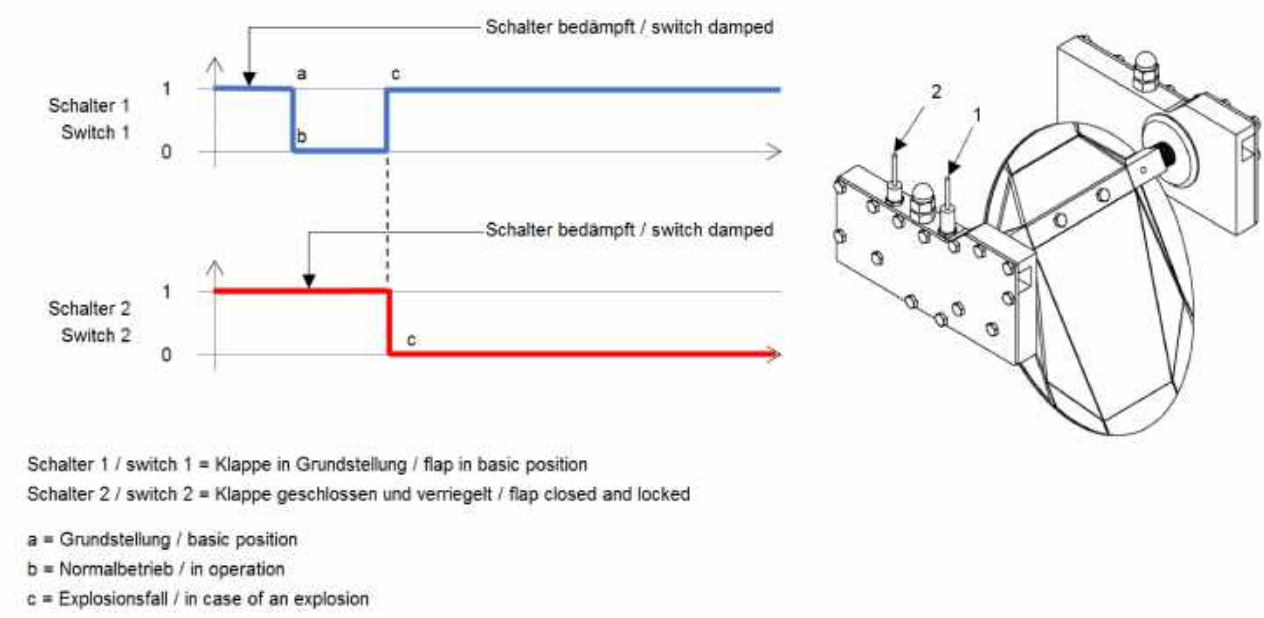

Fig. 17: Function/time diagram

Operation without monitoring

If no switches are used, additional organisational measures must be taken to ensure functional safety and the intended use.

4 Assembly

4.1 Assembly advice

During assembly, ensure good access and easy disassembly options for inspections. The pipeline must be permanently installed upstream and downstream of the valve so that the valve can be dismantled separately.

4.2 Pipeline and flange connection

4.2.1 Pipeline

The pipeline upstream and downstream of the valve must withstand the pressure requirements.

4.2.2 Flange connection

The connection flanges of the valve conform to the following standard: **DIN 24154 Part 2**.

4.3 Direction of explosion

The valve is single-acting and works according to the recoil principle. It is therefore necessary to note the direction of explosion that is indicated on the name plate.

4.4 Installation position

4.4.1 Horizontal installation position

The installation position of the valve is horizontal. This is to be checked with a spirit level after installation. The housing cover of the valve must face upwards when in the closed position.

4.5 Tightening torques

NOTICE!

Use a torque wrench for assembly and pay attention to the permissible tightening torques of the screw connections. These tightening torques can be found in the technical data sheet.

4.6 Earthing

The valve must be earthed via the earthing straps provided.

Fig. 18: Earthing

4.7 Temperatures < +1 °C

At temperatures < +1 °C, there is a risk that the mechanical parts of the valve may become icy if the air is humid. Therefore, condensate must not be present or form inside the valve in such operating conditions.

DANGER!

If mechanical parts become icy, this impairs the function of the valve.

4.8 Swivel direction of the housing cover

Please note the swivel direction of the housing cover during assembly. This is to be changed if it is not suitable. The earthing of the housing cover must also be adapted in this regard. See the separate description in the inspection chapter regarding changing the swivel direction.

5 Functionality test

5.1 Functionality test

1. Installation position

⇨ Check that the valve is installed in the horizontal installation position.

2. Direction of explosion

⇨ Check that the direction of explosion indicated on the name plate corresponds to the actual direction of explosion.

3. Butterfly

⇨ Check whether the butterfly automatically falls from the “Open” position to the “Rest” position due to its own weight.

4. “Rest position” switch function

⇨ Check in conjunction with step 3 whether the switch for the “rest position” emits a signal.

5. “Locked” switch function

⇨ Check the signal from the “locked” position switch by locking the valve manually. ↳ *Further information on page 23*

6. Cover

⇨ Check that the cover is tight and fully closed.

7. Cable gland

⇨ Check that the cable gland is tight.

8. Earthing

⇨ Check that the valve is sufficiently earthed.

If the functionality test has been completed successfully, the valve can be put into operation. If the functionality test has not been completed successfully, maintenance must be carried out on the valve or the valve needs to be inspected.

6 Maintenance

- *The explosion isolation flap valve **must** undergo maintenance three to five days after commissioning and at least once a year thereafter. This maintenance must be carried out be RICO-certified personnel. The seals must be replaced after five years.*
- *Maintenance work that has been carried out is to be logged in the Service app.*
- *The maintenance intervals are dependent on the operating conditions of the valve. See ↳ Chapter 6.1 „Maintenance intervals to be observed“ on page 20 in this regard.*

6.1 Maintenance intervals to be observed

Interval	Maintenance task	Remarks
a) 3 to 5 days after commissioning (mandatory)	Visual inspection	Check that the process corresponds to the intended use and that the function of the valve is guaranteed.
	Check for wear	
	Functionality test	
b) Six weeks after commissioning (depending on process requirements)	Visual inspection	
	Check for wear	
c) Six months after commissioning (depending on process requirements)	Visual inspection	The maintenance work after six months is used as the basis for determining the maintenance intervals, whereby the intervals are adapted to process requirements.
	Check for wear	
d) Yearly (mandatory)	Visual inspection	
	Check for wear	
	Functionality test	
c) Every five years (mandatory)	All seals must be replaced no later than after five years.	

6.2 Recurring maintenance

6.2.1 Visual inspection

1. Corrosion
   ⇨ Check whether the housing and/or the butterfly are corroded.
2. Dust deposits
   ⇨ Check whether there are any dust deposits inside the valve.
3. Condensate formation/moisture
   ⇨ Check whether there is any condensate formation or moisture inside the valve.

DANGER!
Corrosion
Stability is no longer guaranteed if there is corrosion. The corroded parts must be replaced in such cases.

CAUTION!
Dust deposits and condensate formation
– Dust deposits can adversely affect the function of the valve. Any dust deposits must be removed. In addition, check whether the maintenance interval needs to be shortened.
– Condensate formation can lead to corrosion.

6.2.2 Check for wear

Open the housing cover and check the housing and the butterfly for wear.

DANGER!
Valve stability is no longer guaranteed if there is excessive wear. The valve or the butterfly must be replaced in such cases.

Indications of wear

– *If the bare metal of the housing is visible and/or if the coating has been removed in some areas by the medium, the material thickness must be measured and/or checked. If the material thickness of the housing has reduced by > 0.5 mm, the valve needs to be replaced.*

– *Plastic inserts are embedded in the butterfly. If these come to the surface, the butterfly needs to be replaced.*

7 Inspection

NOTICE!

Explosive event

The valve must be **inspected or replaced** after **every explosion, if it shows signs of wear** or **after five years**. If the housing or other components not declared as spare parts are damaged, the valve needs to be replaced. Otherwise the function of the valve cannot be ensured.

Inspections that have been carried out are to be logged in the Service app.

7.1 Unlocking the valve

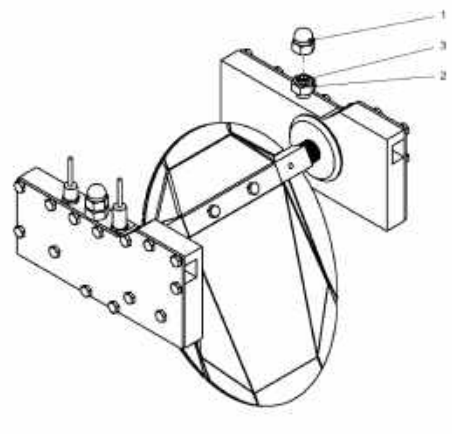

Fig. 19: Unlocking the REDEX® Flap

1. Open the housing cover
   - ⇨ Loosen the screws and then open the housing cover.
2. Unlocking the valve
   - ⇨ Remove the cap nuts (1) which sit on the bearings. Then loosen the counter nuts (2) and the threaded pins (3). The butterfly now moves to the rest position automatically.

3. Check freedom of movement
   ⇨ Check whether the butterfly can be removed without resistance.

   Yes, the butterfly can be moved freely and without any noticeable resistance: Adjust the threaded pins by hand when the butterfly is in the rest position and then secure it with the counter nuts (2). Next, screw the cap nut (1) back onto the threaded pin (3).

   No, the butterfly cannot be moved freely and cannot be moved without noticeable resistance: Replace the bearing and/or the butterfly or get in touch with the competent sales organisation.
4. Close the housing cover
   ⇨ Close the housing cover and secure it with the screws.

7.2 Replacing the butterfly

1. Open the housing cover
   ⇨ Loosen the screws and then open the housing cover.
2. Remove the bearing and butterfly
   ⇨ Unlock the valve *Further information on page 23*. Remove the screws that fix the bearing in place. These are located on the outside of the housing.

   Lift the bearing out of the housing together with the butterfly.
3. Remove the bearing
   ⇨ Pull the bearings on the left and right off of the axle (tool-free plug-in connection) together with the floating bearings. Ensure that the cover plates and the compression springs do not get lost.
4. Install the butterfly
   ⇨ Attach the compression springs on the left and right and the cover plates on the left and right (including O-rings) to the axle. Ensure that the cover plates are positioned correctly. Then attach the bearings on the left and right to the axle. Now move the complete assembly into the housing and secure it with the screws, but do not tighten the screws.

5. Adjust the assembly

⇨ Align the assembly with the housing and then tighten the screws.

Check the following items:

- *Freedom of movement of the butterfly. It must be possible to turn and move the butterfly **without any noticeable resistance**.*
- *Check the gap dimensions between the housing opening and the butterfly in the locked position. **Gaps of > 2.0 mm for ≥ DN315 and > 1.0 mm for ≤ DN280 are not permissible.***

  In the area of the axis, the butterfly must however rest against the housing opening.

  In the event of an explosion, the gaps are compensated by the layered design of the butterfly.

6. Close the housing cover

⇨ Close the housing cover and secure it with the screws.

7.3 Changing the swivel direction of the housing cover

1. Remove the earthing screws and earthing cable

⇨ Then attach them on the opposite side.

2. Loosen the screws on the new side to be opened

⇨ The housing cover can now be opened on the opposite side.

7.4 Replacing the seals

7.4.1 Seals and adhesives

The seals are pre-assembled by RICO Sicherheitstechnik AG.

The following adhesive is to be used:

- Manufacturer: HENKEL
- Product: LOCTITE 401

7.4.2 Replacing the housing cover seal

The housing cover seal consists of two parts.

1. Open the housing cover
   ⇨ Loosen the screws and open the housing cover.
2. Remove the housing cover seal
   ⇨ Remove the housing cover seal in such a way that no residue remains on the housing cover. If any residue remains on the housing cover, remove it using suitable tools or cleaning agents.
3. Prepare the adhesive surface
   ⇨ Clean the prepared surface and the housing cover seal.
4. Glue
   ⇨ Apply adhesive to the prepared surface and carefully attach the housing cover seal. Close the housing cover for an optimum connection.
5. Check the bond
   ⇨ Once the adhesive has hardened, fold up the housing cover and check the adhesion of the bond. If the adhesion is poor, repeat the steps above.
6. Close the housing cover
   ⇨ Close the housing cover and secure it with the screws.

8 Disposal

The product must be handed over to a specialised disposal company which is able to recycle the separated materials, in accordance with the locally applicable disposal regulations. A copy of the operating instructions must be given to the disposal company. The manufacturer bears no liability for damages to people, material or the environment which result from improper disposal of the product.

9 Maintenance book

Maintenance book

Customer / Kunde / Client:	
Type / Typ / Modèle: Fabrication no. / Fabrikations-Nr. / No. de fabrication:	
Installed at / Installiert in Anlage / Installée chez:	
Date of delivery / Lieferdatum / Date de livraison: Date valve was put into service / Inbetriebnahme / Date de mise en service:	

Date / Datum	Visit / Besuch / Visite		Time / Zeit / Heure	Objection / Beanstandung / Constatation
	Service/Wartung			
	Repair / Reperatur / Réparation	Solved / erledigt / éxecution		
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Reason / Ursache / Cause	Repair / Behebung / Réparation	Spare Parts / Ersatzteile / Pièce de rechange	Engineer. / Techn. / Ing.

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